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* * CANCER * *

IN

NEW SOUTH WALES.

By GEORGE LANE MULLINS, M.A., M.D.,
Trinity College, Dublin;
Physician to the Hospice for the Dying, Sydney; President of the Eastern Suburbs Medical Association of Sydney; Vice-president of the Intercolonial Medical Congress of Australasia (1896); Late Assistant Physician, St. Vincent's Hospital, Sydney.

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CANCER IN NEW SOUTH WALES.

INTRODUCTION.

> "If tubercle be infinitely more common than cancer, cancer is still more hopeless, and still more dreaded. It is indeed an intruder of grim mien, and of grave import"—FOTHERGILL.

A DESIRE to add my mite to the store of knowledge concerning cancer in my native land has induced me to publish the results of an investigation I have recently made into the disease and its causation in New South Wales. For some time past I have been engaged in examining and tabulating the statistics afforded by the Government Statistician in Sydney, and, as a result, I have formed several conclusions which I have here set forth.

The statistics contained in this paper are (unless otherwise stated) for the colony of New South Wales for the three-year period 1892-93-94. I may here explain that, under the head of Cancer, I include malignant new growths of every description, and not any particular form.

I. GENERAL STATISTICS.

The estimated mean population of New South Wales for the period comprised within the three years 1892-93-94 was 1,209,798. The total number of deaths from all causes was 45,650, or a yearly average of 15,217. The number of deaths from cancer (malignant disease) was 1,511 (828 males and 683 females), or an average of 504 annually. Therefore 3·309 per cent. of the deaths from all causes were due to cancer.

The most accurate method of estimating the death-rate from any given disease is, however, to calculate the number of deaths from that disease in every thousand inhabitants living. In this way we find the death-rate per thousand inhabitants in the colony to be ·416.

The following table* showing the mean annual death-rates (cancer) per thousand inhabitants in the Australasian colonies for the five-year period ending with 1891 may be of interest.

Victoria	0·55	per	thousand	inhabitants
Tasmania ...	0·50	"	"	"
New Zealand ...	0·44	"	"	"
South Australia...	0·41	"	"	"
West Australia ...	0·40	"	"	"
New South Wales	0·38	"	"	"
Queensland ...	0·29	"	"	"

From the foregoing table it would appear that cancer is less fatal in New South Wales than in any Australasian colony except Queensland. New South Wales has probably one of the lowest death-rates from cancer of all civilized countries in the world.

The following table† shows the number of deaths from cancer in New South Wales in quinquennial periods, with the annual death-rates (cancer) per million of population.

Period.	Deaths (cancer).		Annual death-rate (cancer) per million inhabitants.	
	M.	F.	M.	F.
1857-59‡	74	49	134	120
1860-64	187	173	184	217
1865-69	310	232	260	236
1870-74	415	289	289	242
1875-79	505	371	293	257
1880-84	632	486	287	268
1885-89	953	798	348	353
1890-93‖	1,045	862	416	405

There can be little doubt that cancer, as a cause of death, is increasing in New South Wales, as it is in every Australasian colony, and also in England.

It might be well to mention here that there exists in many quarters a considerable doubt as to whether cancer is really increasing.

It is argued by some that the increase in the number of deaths from cancer is apparent, not real, and is due to the fact that our means of diagnosis are more exact now than they were a quarter of a century ago. How is it, then, I ask, that the number of deaths from the disease increases yearly, while our means of diagnosis are no more advanced than they were ten years ago? The English Registrar-General§ says on this point—"In the face of the constant and great growth of mortality under the head of cancer, and the expressed belief of medical practitioners especially engaged in dealing with this class of diseases that they are more and more common, it seems scarcely possible to maintain the optimistic view that the whole of the apparent increase can be thus explained; and it must be admitted as at any rate highly probable that a real increase is taking place in the frequency of these malignant affections."

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*South Australia. Annual Report of the Registrar-General of Births, Deaths, and Marriages, 1893.

†New South Wales. Statistical Register for 1893 and previous years. Part xi., Vital Statistics. By T. A. Coghlan, Government Statistician.

‡3 years.

‖4 years.

§Annual report of the Registrar-General of England.

In expressing an opinion upon this question I am fully aware that many authorities still maintain opposite views, and I am specially mindful of the able arguments of Mr. George King and Dr. Arthur Newsholme,* who seek to prove that there is no real increase in the mortality from cancer, but that the apparent increase is due to more correct diagnosis, and the apparent proportionate increase to the increase in the number of persons who attain mature age.

II. Geographical Distribution.

The deaths from cancer were distributed throughout the colony as follows:—

Males.

—	1892	1893	1894	Total.
Sydney	35	41	45	121
Suburbs	75	45	57	177
Metropolis	110	86	102	298
Country	159	164	207	530
New South Wales ...	269	250	309	828

Females.

—	1892	1893	1894	Total.
Sydney	36	33	29	98
Suburbs ...	98	70	68	236
Metropolis	134	103	97	334
Country	107	136	106	349
New South Wales ...	241	239	203	683

Total.

—	1892	1893	1894	Total.
Sydney	71	74	74	219
Suburbs	173	115	125	413
Metropolis	244	189	199	632
Country	266	300	313	879
New South Wales ...	510	489	512	1,511

The proportion of population in Sydney (city and suburbs) to that of the whole colony is 34·11 per cent. (census 1891), while the proportion of deaths from cancer is 41·826 per cent. Of course, many of the deaths which take place in Sydney are those of persons who have come from the country districts for treatment in the metropolitan hospitals, &c.

It is unnecessary for me to enter more deeply into the subject of the distribution of cancer, as these figures cannot be relied upon to show the true habitat of the disease, owing to the fact that, for surgical treatment, most patients find their way to Sydney or the large country towns, and thus their deaths are incorrectly credited to such districts. Therefore, to draw any conclusions from such figures would be unsafe, while the results would be of little value.

III. Age and Sex.

Of the 1,511 persons who died of cancer, 828 were males and 683 females.

The following table shows the age-groups for all the victims of the disease, distinguishing males and females:—

Age-Group.	Males.	Females.	Total.
Under 5	4	3	7
5 to 10	1	0	1
10 to 15	1	2	3
15 to 20	0	3	3
20 to 25	9	5	14
25 to 50	9	6	15
30 to 35	17	23	40
35 to 40	32	41	73
40 to 45	43	63	106
45 to 50	85	89	174
50 to 55	109	88	197
55 to 60	95	99	194
60 to 65	146	98	244
65 to 70	108	59	167
70 to 75	76	44	120
75 and upwards	77	45	122
Not stated	16	15	31
Total	828	683	1,511

From this table it will be seen that among males cancer is rare before the age of 30-35 years. Then the mortality gradually increases up to age 60-65, when it reaches its maximum. The decrease after this is very gradual, the malady being frequent at all ages.

Among females there are few deaths before 30-35; then there is a gradual increase until the maximum is reached at 55-65. There is then a gradual decrease, but no age-group after this is exempt.

The period of life which may be termed the "cancer-age" is that from 35 years upwards.

Among males there is one death annually in every 2,364 inhabitants, and among females one in every 2,448; while for both sexes one death occurs in every 2,401.

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*Proceedings of the Royal Society, vol. liv., London.

The subject of age and sex will be discussed further when treating of the parts of the body affected.

IV. Birthplaces, Nationality, &c.

Probably the most interesting part of an inquiry into the etiology of any disease in a new country is that bearing upon the nationality of the victims. It is usually the custom to ignore this factor, and to group together all the deaths from any given cause, as though they all occurred among the native-born population. I have already shown† that the Australasian-born population is not subject to phthisis, at any rate in Queensland and New Zealand. It now remains to be seen whether the high death-rate from cancer is due to the prevalence of the disease among the native-born population of New South Wales.

I have been able to ascertain the places of birth of 1,009 persons, viz., 553 males and 456 females, who have died of malignant disease of various parts of the body during the years 1893-94.

They are as follows:—

Place of Birth.	Males.	Females.	Total.
England and Wales ...	198	161	359
Ireland	115	136	251
Australasia...	107	98	205
Scotland	71	38	109
Germany	25	9	34
China	9	0	9
France	6	0	6
India	3	3	6
Sweden	3	2	5
U.S. America	3	1	4
Canada	1	1	2
Russia	2	0	2
Holland	2	0	2
Switzerland	1	1	2
Channel Islands	1	1	2
Isle of Man	1	1	2
Portugal	0	1	1
Austria	0	1	1
Denmark	1	0	1
Belgium	1	0	1
Nova Scotia	1	0	1
Mauritius	1	0	1
Norway	1	0	1
Ceylon	0	1	1
Cape Colony	0	1	1
Total	553	456	1,009

For the sake of convenience, the total number may be taken as 1,000, when the total for each country will, by merely placing a decimal point before the last figure, represent the percentage of deaths from cancer. For example, England and Wales represent 35.9 per cent., Australasia 20.5 per cent., and so on.

On grouping these figures together, we find that the United Kingdom claims over 71 per cent. of the victims; the Australasian colonies (including New Zealand and Fiji) 20·3 per cent., Germany 3·4 per cent., while all the other countries together are represented by about 5 per cent.

Now, at the time of the census enumeration in 1891, the natives of the United Kingdom resident in New South Wales represented 23.50 per cent. of the population; Australasians, 72·29 per cent.; Germans, ·85 per cent.; and all other countries taken together 3·36 per cent.

The following table will, perhaps, make this more clear:—

Birth-place.	Percentage of Population.	P. C. of Deaths (Cancer).
United Kingdom ..	23·50	71·2
Australasia	72·29	20·3
Germany	·85	3·4
All other countries ...	3·36	5·1
—	100·00	100·00

We see, therefore, that the United Kingdom shows a large excess in the cancer victims, as also does Germany, while Australasia is represented by a very small section of its natives.

The following statement shows that cancer may fairly be considered to be an uncommon disease among the Australian-born inhabitants of New South Wales.

Among the English-born male inhabitants there is one death annually among every 966; among the Irish-born, one in 686; among the Scotch, one in 648; among the Germans, one in 558; while among the Australian-born there is one death in every 7,746.

For the female population the results are equally satisfactory. English, 1 in 736; Irish, 1 in 522; Scotch, 1 in 726; Germans, 1 in 574; Australasians, 1 in 8,242.

For both sexes the figures are:—English, 1 in 858; Irish, 1 in 598; Scotch, 1 in 674; Germans, 1 in 562; Australasians, 1 in 7,984.

It may naturally be objected that most of those who come to the colonies from other countries have reached the cancer age at the time of their arrival here, and that this circumstance favours the Australasian figures unduly. We may therefore reckon the deaths as divided among those who have arrived at the age of 21 years. The results will then stand as follows :—

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†*Australasian Medical Gazette*, August, 1895.

Birth-place.	No. of persons aged 21 and over.	Death-rate from cancer. 1 in—
England and Wales ...	134,263	748
Scotland	32,365	594
Ireland...	73,522	562
Germany	9,142	538
Australasia	280,698	2,738

There is, therefore, strong reason for believing that cancer is not a prevalent disease among the native-born Australians.

V. LENGTH OF RESIDENCE IN AUSTRALASIA.

It is unnecessary for me to go into the exact figures under this head, but the returns show that in the large majority of cases the patients have lived for many years in the Australasian colonies. This is true of the natives of Australasia, as well as of those born elsewhere.

The following table shows the length of residence in Australasia of persons who died during 1893.

—	Males.	Females.	Total.
Under 1 year	—	1	1
1 year	—	—	—
2 years	—	2	2
3 "	1	3	4
4 "	—	2	2
5-10 "	7	11	18
10-15 "	12	18	30
15-20 "	6	11	17
20 and over	143	137	280
Not stated	33	6	39
Born in Australasia ...	48	48	96
Total deaths ...	250	239	489

VI. PART OF BODY AFFECTED.

In 645 males the part of the body affected is stated to have been as follows :—

Stomach	222	Upper extremity ...	6
Liver	92	Peritoneum	4
Tongue	47	Pancreas	4
Neck...	32	Penis	4
Face	31	Eye	2
Intestine	24	Pharynx	2
Abdomen	23	Axilla	2
Rectum	21	Thorax	2
Throat	20	Kidney	2
Mouth	19	Brain	1
Œsophagus	18	Ear	1
Lip	16	Head	1
Jaw	14	Bronchial glands ...	1
Bladder	9	Pelvis	1
Larynx	7	Breast	1
Lung	7	Prostate	1
Lower extremity ...	7	Testicle	1

Unspecified, 183.

In 597 females the parts affected were as follows :—

Uterus	202	Mouth	3
Stomach	88	Pancreas	3
Liver	84	Eye	2
Breast	80	Neck	2
Intestine	25	Heart...	2
Abdomen	18	Thorax	2
Face	15	Upper extremity ...	2
Rectum	14	Lower extremity ...	2
Lung	7	Ovary...	2
Peritoneum... ...	6	Head	1
Vagina	6	Lip	1
Jaw	5	Nose	1
Brain	4	Bronchial glands ...	1
Œsophagus	4	Bladder	1
Tongue	4	Spinal cord	1
Kidney	4	Spleen	1
Pelvis	4	Unspecified	88

For both sexes the numbers show :—

Stomach	310	Pancreas	7
Uterus	202	Kidney	6
Liver	176	Vagina	6
Breast	81	Brain	5
Tongue	51	Pelvis...	5
Intestines	49	Penis	4
Face	46	Eye	4
Abdomen	41	Thorax	4
Rectum	35	Pharynx	2
Neck...	34	Axillary glands ...	2
Mouth	22	Head	2
Œsophagus	22	Bronchial glands ...	2
Throat	20	Heart...	2
Jaw	19	Ovary	2
Lip	17	Ear	1
Lung	14	Prostate	1
Bladder	10	Testicle	1
Peritoneum ..	10	Nose	1
Lower extremity ...	9	Spinal cord	1
Upper extremity ...	8	Spleen	1
Larynx	7	Unspecified	269

Total, 1,242.

STOMACH.

From the foregoing tables it will be seen that this organ is affected in no less than 310 persons, viz., 222 males and 88 females. This is equal to 25 per cent. of the specified cases of cancer.

Cancer of the stomach occurs from age 25-30 upwards, no higher age-group being exempt. It is, however, more frequent from 45 to 75 among males, and from 50 to 70 among females, as the following table will show :—

Age-group ..	25 30	30 35	35 40	40 45	45 50	50 55	55 60	60 65	65 70	70 75	75 80	80 85	Total.
Males . ..	2	4	8	9	28	30	26	40	30	30	10	2	219
Females ..	0	2	4	8	8	11	12	11	1	9	5	1	86
Total	2	6	12	17	36	41	38	51	45	39	15	3	305

Ewald* states that "75 per cent. of all the cases of cancer of the stomach occur between the fortieth and seventieth years; the maximum lies between the fiftieth and sixtieth, or, according to Lebert, between the forty-first and sixtieth years. Cancer of the stomach rarely appears before the thirtieth year."

It will be seen that my figures agree fairly well with those of Ewald. Brinton† truly says that cancer of the stomach is "obscure in its symptoms, frequent in its recurrence, fatal in its event."

UTERUS.

The organ most frequently affected in females is the uterus. Of 585 females who died of cancer no less than 202 were affected in this part. The period of life at which death occurs is from 25 to 85 years, but it is not common before the fortieth year.

The following table shows the age-groups :—

20 to 25	1	55 to 60	35
25 to 30	3	60 to 65	26
30 to 35	11	65 to 70	15
35 to 40	17	70 to 75	7
40 to 45	17	75 to 80	4
45 to 50	33	80 to 85	1
50 to 55	28	Not stated.	4
	Total, 202		

The following table shows the number of children borne by women who died of cancer of the uterus during 1893-94 :—

—	No. of children.	No. of women dying.	Total No. of children.
Single	0	2	0
Married	0	17	0
,, ...	1	10	10
,, ...	2	10	20
,, ...	3	7	21
,, ...	4	8	32
,, ...	5	11	55
,, ...	6	6	36
,, ...	7	10	70
,, ...	8	13	104
,, ...	9	3	27
,, ...	10	8	80
,, ...	11	4	44
,, ...	12	1	12
,, ...	13	2	26
,, ...	14	1	14
,, ...	15	1	15
,, ...	16	1	16
Total	—	115	582

From this table it appears that the average number of children borne by each female dying of cancer of the uterus is 5·07. It will also be noticed that only two single females died of the disease, and seventeen who were married but had no issue. There is no information as to whether any of these women had ever had miscarriages. The remaining 96 had borne from one to sixteen children each. The average number of children left by married women dying of cancer of the uterus was 5·15. The largeness of the families borne by the great majority of the patients is very striking.

Pozzi‡ tells us that "the local predisposing causes that have been invoked are principally laceration of the cervix and the cervical metritis it brings along with it (Emmet, Breisky). Mangin has made upon this point some histological researches of great interest. Frequent parturition (Gusserow) has also been accused, but it is possible that it acts simply by the lacerations and the inflammation of the cervix that are so common a result thereof."

LIVER.

Cancer of the liver caused 176 deaths. Both sexes suffer in about the same proportion, the numbers being 92 males and 84 females. The following table shows the ages at death :—

Age-Group.	M.	F.	Total.	Age-Group.	M.	F.	Total.
20 to 25	1	0	1	55 to 60	14	12	26
25 to 30	0	0	0	60 to 65	22	16	38
30 to 35	0	4	4	65 to 70	15	10	25
35 to 40	5	3	8	70 to 75	8	9	17
40 to 45	5	11	16	75 to 80	3	1	4
45 to 50	4	9	13	80 to 85	2	0	2
50 to 55	12	9	21	Not stated	1	0	1

Male deaths occur principally between 50 and 70 years of age, and females between 40 and 70.

BREAST.

The breast was affected in 81 cases; one of these being a male. It occurs in females at any period of adult life over 30 years.

FEMALES.

25 to 30	1	60 to 65	13
30 to 35	1	65 to 70	4
35 to 40	4	70 to 75	6
40 to 45	11	75 to 80	3
45 to 50	9	80 to 85	3
50 to 55	8	85 and over	2
55 to 60	14	Not stated	1

The one male who died of cancer of the breast was aged 42.

There can be little doubt that cancer of the breast is more common in New South Wales than these figures would lead us to believe. Owing to its external position it is easily recognised in its early stage, when removal by operation sometimes ends the trouble, at any rate so far as the breast is concerned. The disease probably recurs later on in other parts. But for the fact that its position is favourable for removal it is probable that it would cause more deaths among females than even cancer of the uterus.

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*Ewald. Lectures on Diseases of the Digestive Organs, Vol. II., New Sydenham Society's Translation, by Dr. R. Saundby, 1892.

†Brinton. Lectures on the Diseases of the Stomach, 1864.

‡Pozzi. A Treatise on Gynæcology, Clinical and Operative Vol. II. New Sydenham Society, 1893.

TONGUE.

The tongue is affected chiefly in males. Of 51 cases recorded only four were females. The disease is rare under 40 years of age, and is most frequent from 45 to 75 years.

OTHER PARTS OF THE BODY.

Males and females are affected equally with cancer of the intestines and abdomen (not further defined). The face is attacked more frequently in males. All the patients dying of cancer of the throat, larynx and pharynx were males. The great majority of cases of cancer of the lip, jaw, bladder, and upper and lower extremities were also males. Two cases of cancer of the heart among females are recorded.

ANATOMICAL GROUPS.

If we group together the affections of the various localities of the body without regard to their physiological functions, we obtain the following information:—

Anatomical Group.	Males.	Females.	Total.
Head and neck	211	42	253
Thorax (excluding breast)	12	12	24
Abdomen (exc. generative organs)	402	249	651
Upper extremity	6	2	8
Lower extremity	7	2	9
Organs of generation ..	7	290	297
Totals	645	597	1,242

It will be seen that males suffer from cancer in the head and neck, abdomen, and upper and lower extremities to a much greater extent than females, but women are affected much more by cancer of the organs of generation.

VII. ETIOLOGY.

"What is the cause of cancer?" is a question which has for many years been put to the medical profession, and to which, so far, no thoroughly satisfactory answer has been given. The causes usually assigned are:—

Heredity
Chronic irritation
Climate
Geographical peculiarities
State of the soil
Occupation
Meat-eating
Tea or alcohol drinking
Tobacco-smoking
Age
Sex
Micro-parasites.

We may examine these supposed causes, and see how far they apply to the disease in this country.

HEREDITY.—There is some considerable amount of disagreement among medical authorities as to the hereditability of cancer. On examining the statistics given under the head of birth-places, &c., the remarkable persistence of the disease among the natives of Great Britain would lead one to conclude that malignant disease was hereditary in the English race. But, on the other hand, the natives of Australasia are chiefly the offspring of British parents, yet they do not suffer so severely from the disease. It may then be asserted that, though predisposed, the Australian climate prevents the development of the growths. This, however, is disproved by the fact that the large majority of the victims of the disease have lived in the Australasian colonies for perhaps 40, 50, or even 60 years before death. Some remarkable cases of the appearance of cancer in certain families seem to point to more than coincidence. In his Report on Cancer of the Breast in England, Mr. H. T. Butlin* quotes a case reported by Dr. Arthur Roper, of Exeter. "Mr. D. was one of 22 children. There is no history of cancer in either his or his wife's family, and neither he nor his wife had cancer. But they had seven children, six of whom died of cancer, the men of cancer of the stomach or bowels, the women of cancer of the breast. The seventh of the family is still alive, an old man, aged 82, crippled with gout, but not cancerous." Not long ago I attended a patient who was born in New South Wales, who died in Sydney from cancer of the cervix uteri. Before her death I made inquiries, and gathered the following information as to the family history.

Male	Female.
b. & d. England	b. & d. England.
Cancer of mouth.	Internal cancer.

Daughter
b. England ; d. N.S.W.
Cancer of Uterus

Daughter (my patient)
b. & d. N. S. W.
Cancer of cervix uteri.

Is the occurrence of cancer in three consecutive generations merely a coincidence? If so, it is truly remarkable!

Sir James Paget† says: "A parent may transmit to children a tendency to gout, or phthisis, or any other heritable constitutional disease, long before his or her self has shown any clear signs of it. A parent may 'die and leave no sign,' long after transmitting to

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*Butlin. Report on Cancer of the Breast. *British Medical Journal*, February 26, 1887

†Paget. Clinical Lectures and Essays. "Constitutional Diseases," 2nd Edition, 1879.

offspring such tendencies, such methods of progressive organic change, as in them, or some of them, will surely lead to the development of a disease which the parent did not display." He also says that he does not believe that, "through any external conditions whatever, and independent of inheritance, anyone can become the subject of cancer, gout, tuberculosis, or any of the diseases allied to them. External conditions may hasten the appearance of such diseases, determine their seat, and variously modify them in the person affected, but seem to me utterly inadequate to originate them." I do not know, however, that we are justified in going so far as this. The same authority holds that "in cancer there are two factors, whose meeting is essential to the production of the complete disease—the one diffused, constitutional, inherited, and, at its maturity, ready to appear in any part fit for it; the other local and consisting essentially of some degeneracy of a natural structure, a degeneracy which may be that of senile or other timely decay, or may be the result of injury or inflammation, or any form of what one must still vaguely call irritation."

It is very rarely possible to obtain the family history of cancer patients, for the reason that cancer is a disease of late life, and old people are unable to state accurately the cause of death of their parents. How often do patients tell us that their ancestors have died of "an internal complaint," or an "internal tumour," after an illness of considerable length!

In the report referred to, Mr. Butlin says: "I confess that when I first proposed the subject of the inheritance of cancer for collective investigation, it was with a very small belief in the reality of inheritance, and with a strong believe that the inquiry would result in such a failure of evidence as to diminish largely the impression which prevails that cancer is due in part to the influence of inheritance. I am forced to own that the mass of evidence which has been accumulated by the inquiry has led me to a different view. The number of instances in which there is a history of cancer in the direct line of descent, the manner of the relationship in those families in which more than one of the patient's relatives were the victims of cancer, and the very strong probability that the case is throughout under—rather than over—estimated, are, to my mind, proofs which cannot be resisted. Compare this evidence of the influence of inheritance with that on which some of the undoubted causes, whether exciting or predisposing, rest, and the balance is largely in favour of inheritance."

A very important question now remains to be answered. If cancer be hereditary among the British race, why do not the offspring, the native-born Australians, succumb to the disease? I would with diffidence suggest the following solution:—Young married people in Australia are, as a rule, more healthy and less disposed to disease than the corresponding classes in England. They are, therefore, able to transmit to their children a more perfect constitution, and consequently a greater power of resisting disease. How, otherwise, may we explain the fact that persons, whether born in New South Wales or in Great Britain, reside here for so many years, and yet the British-born succumb to cancer to a very much greater degree than the Australian-born? That cancer is hereditary I have little doubt, but I believe that a healthy constitution in the parents about the time of conception may modify or completely annul the hereditary tendency to the disease.

CHRONIC IRRITATION.—Chronic irritation is by all admitted to play a very important part in the appearance of cancer, but whether it is a primary cause or secondary to heredity is a question which must remain an open one for the present.

CLIMATIC INFLUENCES, GEOGRAPHICAL OR TOPOGRAPHICAL PECULIARITIES, STATE OF THE SOIL, FOOD OR DRINK (except as stated later on) OCCUPATION, &c., do not appear to be important factors in the production of the disease in this country.

MEAT-EATING AND CONSUMPTION OF TEA OR ALCOHOL are put forward strongly as causes of cancer in New South Wales. Let us examine the evidence on the subject. With regard to meat-eating, Mr. Coghlan† estimates the consumption of meat in this colony to exceed that of any other country in the world. On the subject of tea-drinking the same authority says: "The consumption of tea is universal throughout the colonies, and the four million people in Australasia use fully twice the quantity of this beverage which is consumed by the millions who inhabit continental Europe, other than Russia." If, then, these articles caused cancer we should find the disease more common in this colony than in any part of the world. But we have already seen that such is not the case.

Then, again, the average amount of proof-spirit consumed by each person has decreased from 3·37 gallons in 1885, to 2·17 gallons in 1894, yet the deaths from cancer have risen 130 per million within the same period. These articles of diet may act indirectly by causing long continued irritation of certain parts of the body, *e.g.*, the stomach or liver, and may thus determine the *part of the body* to become affected, but this is quite a different matter to causing the cancer itself.

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†Coghlan. The Wealth and Progress of New South Wales, 1894, vol. i.

TOBACCO-SMOKING may, in the same manner, account for the occurrence of cancer in the lip, face, tongue, mouth, jaw, or other parts with which the vapour and hot smoke of the tobacco come in contact. This may in some way account for the greater prevalence of cancer of these parts in men. It would, however, be interesting to know whether such cancer is more common among smokers than non-smokers.

AGE.—In late life there is diminished power of resistance to disease, and therefore age may act indirectly in determining the *time* of the appearance of the cancer.

SEX.—The subject of sex in relation to cancer has already been considered.

The MICRO-PARASITIC theory I must leave to those more skilled in bacteriology.

As said before, then, most of the supposed causes of cancer are really not the causes of the cancer itself, but the determining factors in its appearance in certain parts of the body.

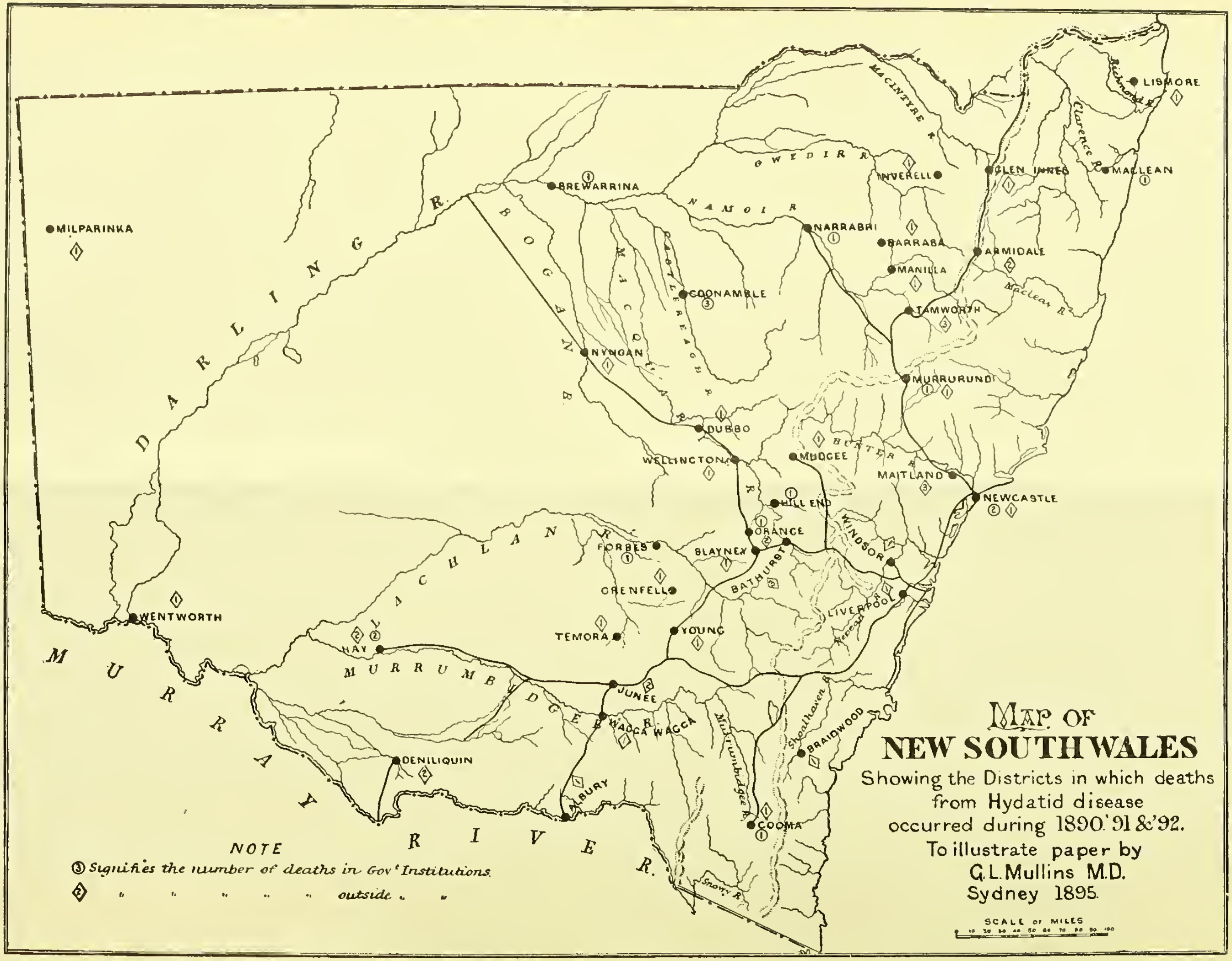
VIII. SUMMARY.

It might be well to summarize briefly the more important conclusions which I have formed in the course of this inquiry.

1. Although New South Wales has one of the lowest death-rates in the world from cancer, the disease is undoubtedly increasing in the colony.
2. The cancer-age is from 35 years upwards.
3. Cancer is slightly more prevalent among males than among females. The proportion is as 1·035 : 1.
4. The deaths from cancer occur chiefly among natives of Great Britain and Germany.
5. Climate appears to have little or no effect on the production of the disease.
6. The stomach is the organ most affected in males, the uterus in females. The stomach is also largely affected in females.
7. Heredity is the chief cause of the production of cancer. Chronic irritation is an important factor, but its true significance (*i.e.*, whether it can originate cancer *per se*), is still a matter of dispute. Meat-eating, alcohol or tea-drinking, tobacco-smoking, &c., are not primary causes of cancer.

CONCLUSION.

In concluding, I may answer a question which will probably have suggested itself to some before now. If cancer be hereditary, what practical good can come from such a paper as this? I answer: Cancer is undoubtedly hereditary, but heredity alone does not cause the appearance of a malignant new growth. Some other cause must determine this. If, then, we know what are the secondary causes, or, more correctly, DETERMINING INFLUENCES, we may seek to prevent their action on those who are the offspring of cancerous parents. In a flower-seed, for instance, the vital principle, or germ, is latent within it until secondary influences, such as soil, air, moisture, &c., act upon it, when growth takes place. If we wish to preserve the seed, and to prevent it from growing, we must counteract these influences. So it is with cancer. The seeds of the disease are latent in some persons, and only require the agency of long-continued or chronic irritation, &c., to start development, and then the new growth increases in size, and the disease becomes established.



Map of
NEW SOUTH WALES
Showing the Districts in which deaths
from Hydatid disease
occurred during 1890, '91 & '92.
To illustrate paper by
G. L. Mullins M.D.
Sydney 1895.

NOTE

③ Signifies the number of deaths in Gov^t Institutions.

◈ " " " " " outside " "